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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of
PENICAUD ET AL.

Serial No. 10/585,094

Filed: June 30, 2006



Atty. Ref.: 1721-119

Group: Unknown

Examiner: Unknown

For: METHOD FOR DISSOLVING CARBON NANOTUBES AND THE USE THEREOF

* * * * *

October 20, 2006

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1540

Sir:

SUBMISSION

Submitted herewith is a copy of the English translation of the International Preliminary Examination Report issued in the corresponding PCT/FR2004/003383.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By:

A handwritten signature in black ink, appearing to read "B. J. Sadoff".

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PCT

NOTIFICATION DE TRANSMISSION DE COPIES
DE LA TRADUCTION DU RAPPORT D'EXAMEN
PRÉLIMINAIRE INTERNATIONAL
SUR LA BREVETABILITÉ (CHAPITRE I OU CHAPITRE II
DU TRAÎTE DE COOPÉRATION EN MATIÈRE DE BREVETS)

(règles 44bis.3.c) et 72.2 du PCT)

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13 SEP. 2006

REÇU

Date d'expédition (jour/mois/année) 08 septembre 2006 (08.09.2006)	
Référence du dossier du déposant ou du mandataire CP 61174PCT	NOTIFICATION IMPORTANTE
Demande internationale n° PCT/FR2004/003383	Date du dépôt international (jour/mois/année) 24 décembre 2004 (24.12.2004)
Déposant CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE etc	

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Il appartient au déposant d'établir la traduction en question et de la remettre directement à chaque office élu intéressé dans le délai applicable (règle 74.1). Voir le volume II du *Guide du déposant du PCT* pour de plus amples renseignements.

Fonctionnaire autorisé

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TRAITÉ DE COOPÉRATION EN MATIÈRE DE BREVETS

PCT

RAPPORT PRÉLIMINAIRE INTERNATIONAL SUR LA BREVETABILITÉ (chapitre I du Traité de coopération en matière de brevets)

(règle 44bis du PCT)

Référence du dossier du déposant ou du mandataire CP 61174PCT	POUR SUITE À DONNER		Voir le point 4 ci-dessous
Demande internationale no. PCT/FR2004/003383	Date du dépôt international (<i>jour/mois/année</i>) 24 December 2004 (24.12.2004)	Date de priorité (<i>jour/mois/année</i>) 30 December 2003 (30.12.2003)	
Classification internationale des brevets (8 ^e édition, sauf indication d'une #dition antérieure) Voir les informations pertinentes dans le formulaire PCT/ISA/237			
Déposant CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE			

<p>1. Le présent rapport préliminaire international sur la brevetabilité (chapitre I) est établi par le Bureau international au nom de l'administration chargée de la recherche internationale selon la règle 44bis.1.a).</p> <p>2. Ce RAPPORT comprend un total de 7 feuilles, y compris la présente feuille de couverture.</p> <p>Dans les feuilles jointes, toute référence à l'opinion écrite de l'administration chargée de la recherche internationale doit être entendue, à la place, comme une référence au rapport préliminaire international sur la brevetabilité (chapitre I).</p>																								
<p>3. Le présent rapport contient des indications relatives aux points suivants :</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><input checked="" type="checkbox"/></td> <td>Cadre n° I</td> <td>Base de l'opinion</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cadre n° II</td> <td>Priorité</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cadre n° III</td> <td>Absence de formulation d'opinion quant à la nouveauté, l'activité inventive et la possibilité d'application industrielle</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cadre n° IV</td> <td>Absence d'unité de l'invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Cadre n° V</td> <td>Déclaration motivée selon l'article 35.2) quant à la nouveauté, l'activité inventive et la possibilité d'application industrielle; citations et explications à l'appui de cette déclaration</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cadre n° VI</td> <td>Certains documents cités</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cadre n° VII</td> <td>Certaines irrégularités relevées dans la demande internationale</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Cadre n° VIII</td> <td>Certaines observations relatives à la demande internationale</td> </tr> </table> <p>4. Le Bureau international communiquera le présent rapport aux offices désignés conformément aux règles 44bis.3.c) et 93bis.1 mais pas avant l'expiration du délai de 30 mois à compter de la date de priorité (règle 44bis.2), sauf si le déposant a présenté une requête expresse à cet égard en vertu de l'article 23.2).</p>	<input checked="" type="checkbox"/>	Cadre n° I	Base de l'opinion	<input type="checkbox"/>	Cadre n° II	Priorité	<input type="checkbox"/>	Cadre n° III	Absence de formulation d'opinion quant à la nouveauté, l'activité inventive et la possibilité d'application industrielle	<input type="checkbox"/>	Cadre n° IV	Absence d'unité de l'invention	<input checked="" type="checkbox"/>	Cadre n° V	Déclaration motivée selon l'article 35.2) quant à la nouveauté, l'activité inventive et la possibilité d'application industrielle; citations et explications à l'appui de cette déclaration	<input type="checkbox"/>	Cadre n° VI	Certains documents cités	<input type="checkbox"/>	Cadre n° VII	Certaines irrégularités relevées dans la demande internationale	<input type="checkbox"/>	Cadre n° VIII	Certaines observations relatives à la demande internationale
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<input type="checkbox"/>	Cadre n° IV	Absence d'unité de l'invention																						
<input checked="" type="checkbox"/>	Cadre n° V	Déclaration motivée selon l'article 35.2) quant à la nouveauté, l'activité inventive et la possibilité d'application industrielle; citations et explications à l'appui de cette déclaration																						
<input type="checkbox"/>	Cadre n° VI	Certains documents cités																						
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<p>Bureau international de l'OMPI 34, chemin des Colombettes 1211 Geneva 20, Switzerland no de télécopieur +41 22 338 82 70</p>	<p>Date d'établissement du présent rapport 29 August 2006 (29.08.2006)</p> <p>Fonctionnaire autorisé Athina Nickitas-Etienne e-mail: pt04@wipo.int</p>
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT
TRANSLATION

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Date of mailing (day/month/year)	See Form PCT/ISA/210 (sheet 2)
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Applicant's or agent's file reference CP 61174PCT		FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/FR2004/003383	International filing date (day/month/year) 24.12.2004	Priority date (day/month/year) 30.12.2003
International Patent Classification (IPC) or both national classification and IPC C01B31/02		
Applicant CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE		

1. This opinion contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|--|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the opinion |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP	Authorized officer
Facsimile No.	Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/FR2004/003383

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

This opinion has been established on the basis of a translation from the original language into the following language

, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

a sequence listing

table(s) related to the sequence listing

b. format of material

in written format

in computer readable form

c. time of filing/furnishing

contained in the international application as filed.

filed together with the international application in computer readable form.

furnished subsequently to this Authority for the purposes of search.

3. In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.	PCT/FR2004/003383
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Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
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1. Statement

Novelty (N)	Claims <u>1-15</u>	YES
	Claims _____	NO
Inventive step (IS)	Claims <u>1-15</u>	YES
	Claims _____	NO
Industrial applicability (IA)	Claims <u>1-15</u>	YES
	Claims _____	NO

2. Citations and explanations:

Reference is made to the following document:

D1: WO 02/088025 A (NEW YORK UNIVERSITY; SUN YI (US); WILSON STEPHEN (US)) 7 November 2002 (2002-11-07)

1- Comment:

Claim 1, from the way in which it is worded, does not mention a particular solvent and, consequently, is not considered to be based on the description pursuant to PCT Article 6. This is because the description makes reference to the dispersion of carbon nanotubes in a polar solvent (page 2, line 34), suitable polar organic solvents being mentioned on page 3, lines 16-19.

Moreover, dependent claim 5 mentions the following information: "...characterized in that *the polar organic solvents are...*" and makes reference to polar organic solvents that have not been presented beforehand.

The expression "*dissolution of carbon nanotubes*" used in claim 1 introduces a lack of clarity in the

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

interpretation of this claim.

This is because the process presented in claim 1 may be considered as a process for the *dissolution* of nanotube aggregates or else as a process for the *dispersion* of carbon nanotubes in which, *a priori* the nanotubes retain their integrity.

2- Novelty:

Independent claim 1 proposes a method of dispersing carbon nanotubes in a solvent consisting, firstly, in reducing the nanotubes, resulting in negatively charged nanotubes combined with positive counterions.

No document of the prior art cited mentions such a process.

Consequently, the subject matter of process claim 1 and of its dependent claims 2-12, as well as the subject matter of application claims 13-15, is novel (PCT Article 33(2)).

3- Inventive step:

Document D1 is considered to be the closest prior art to the subject matter of claim 1. D1 mentions the difficulty of dispersing carbon nanotubes in most solvents, the difficulty being due in particular to the fact that they are in the form of aggregates (pages 2 and 3, paragraphs 4 and 5).

D1 reports that carbon nanotubes, treated by being dispersed in an electron donor compound, such as an

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

aromatic amine, then become dispersible in polar or non-polar organic solvents (pages 4 and 5, paragraphs 16 and 17). The reaction mechanism that occurs between the carbon nanotubes and an aromatic amine is proposed in D1, paragraph 39.

The difference between claim 1 of the present invention and D1 is that, in the present application, the method involves negatively charged nanotubes combined with positive counterions, whereas, in D1, the method uses a compound that acts as dispersion agent which in fact seems to form a complex with the carbon nanotubes (see D1, page 4, paragraph 10 and page 15, paragraph 39).

This difference leads to a method of dispersing carbon nanotubes that makes it possible to preserve their integrity and their properties.

The problem to be solved is therefore to propose an alternative method of dispersion that respects the carbon nanotubes.

D1, considered by itself or in combination with another document of the cited prior art, does not provide information which would allow a person skilled in the art to modify the method of D1 in order to arrive at a method according to claim 1 of the present application.

The subject matter of claim 1 does not follow in an obvious manner from the prior art.

Consequently, the subject matter of claim 1 and of its

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/FR2004/003383

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

dependent claims 2-12, and also the subject matter of claims 13-15, is considered to involve an inventive step.